

What is claimed is:

1. A method of manufacturing a thin film transistor device, comprising the steps of:

forming a semiconductor layer having a predetermined configuration on a substrate;

forming a first insulation film on the semiconductor layer;

forming a gate electrode of a thin film transistor of a first conductivity type on the first insulation film;

forming source and drain regions and low density impurity regions by implanting an impurity of the first conductivity type in the semiconductor layer using the gate electrode as a mask;

forming a mask layer on the low density impurity regions;

forming a gate insulation film by patterning the first insulation film using the mask layer and implanting the impurity of the first conductivity type in the source and drain regions using the mask layer continuously; and

forming a second insulation film having a predetermined thickness on the source and drain regions and the low density impurity regions after removing the mask layer and irradiating the same with laser light to activate the impurity in the source and drain regions and the low density impurity regions.

2. A method of manufacturing a thin film transistor device according to claim 1, further comprising the steps of:

forming a gate electrode of a thin film transistor of a second conductivity type on the first insulation film at the same time when the gate electrode of the transistor of the first

conductivity type is formed;

forming a gate insulation film of the thin film transistor of the second conductivity type at the same time when the gate insulation film of the transistor of the first conductivity type is formed;

forming a second mask layer on the thin film transistor of the first conductivity type after removing the mask layer and before the irradiation with laser light; and

implanting an impurity of the second conductivity type in source and drain regions of the thin film transistor of the second conductivity type using the second mask layer.

3. A method of manufacturing a thin film transistor device, comprising the steps of:

forming a semiconductor layer having a predetermined configuration on a substrate;

forming a first insulation film on the semiconductor layer;

forming a gate electrode of a thin film transistor of a first conductivity type on the first insulation film;

forming a second insulation film having a predetermined thickness and thereafter forming a gate insulation film and a mask layer having the predetermined thickness on the semiconductor layer under the gate electrode and in the vicinity thereof by patterning the first and second insulation films;

forming source and drain regions by implanting an impurity of the first conductivity type in the semiconductor layer using the gate electrode, the gate insulation film, and the mask layer as masks;

forming low density impurity regions in the vicinity of the gate electrode by implanting the impurity of the first conductivity type in the semiconductor layer under different conditions for impurity implantation using the gate electrode as a mask; and

activating the impurity in the source and drain regions and the low density impurity regions by irradiating with laser light.

4. A method of manufacturing a thin film transistor device according to claim 3, further comprising the steps of:

forming a gate electrode of a thin film transistor of a second conductivity type on the first insulation film at the same time when the gate electrode of the transistor of the first conductivity type is formed;

forming a gate insulation film of the thin film transistor of the second conductivity type at the same time when the gate insulation film of the transistor of the first conductivity type is formed;

forming a second mask layer on the thin film transistor of the first conductivity type after forming the low density impurity regions and before the irradiation with laser light; and

implanting an impurity of the second conductivity type in source and drain regions of the thin film transistor of the second conductivity type using the second mask layer.

5. A method of manufacturing a thin film transistor device,

comprising the steps of:

forming a semiconductor layer having a predetermined configuration on a substrate;

forming a first insulation film on the semiconductor layer;

forming a gate electrode of a thin film transistor of a first conductivity type on the first insulation film;

forming source and drain regions and low density impurity regions by implanting an impurity of the first conductivity type in the semiconductor layer using the gate electrode as a mask;

forming a second insulation film having a predetermined thickness and thereafter forming a gate insulation film and a mask layer having the predetermined thickness on the low density impurity regions under the gate electrode and in the vicinity thereof by patterning the first and second insulation films;

forming source and drain regions by implanting the impurity of the first conductivity type in the semiconductor layer under different conditions for impurity implantation using the gate electrode, the gate insulation film, and the mask layer as masks; and

activating the impurity in the source and drain regions and the low density impurity regions by irradiating with laser light.

6. A method of manufacturing a thin film transistor device according to claim 5, further comprising the steps of:

forming a gate electrode of a thin film transistor of a second conductivity type on the first insulation film at the same time when the gate electrode of the transistor of the first

conductivity type is formed;

forming a gate insulation film of the thin film transistor of the second conductivity type at the same time when the gate insulation film of the transistor of the first conductivity type is formed;

forming a second mask layer on the thin film transistor of the first conductivity type after forming the source and drain regions and before the irradiation with laser light; and

implanting an impurity of the second conductivity type in source and drain regions of the thin film transistor of the second conductivity type using the second mask layer.

7. A method of manufacturing a thin film transistor device according to claim 1, further comprising the steps of:

forming a third insulation film on the second insulation film;

forming contact holes by providing openings in each of the second and third insulation films on the source and drain regions; and

forming source and drain electrodes that are connected to the source and drain regions respectively through the contact holes.

8. A method of manufacturing a thin film transistor device according to claim 1, wherein the thickness of the second insulation film is determined such that the degrees of reflection of the laser light at the low density impurity regions and the source and drain regions of the thin film transistor of the first

conductivity type are substantially equal to each other.

9. A method of manufacturing a thin film transistor device according to claim 3, wherein the thickness of the second insulation film is determined such that the degrees of reflection of the laser light at the low density impurity regions and the source and drain regions of the thin film transistor of the first conductivity type are substantially equal to each other.

10. A method of manufacturing a thin film transistor device according to claim 5, wherein the thickness of the second insulation film is determined such that the degrees of reflection of the laser light at the low density impurity regions and the source and drain regions of the thin film transistor of the first conductivity type are substantially equal to each other.

11. A method of manufacturing a thin film transistor device according to claim 8, wherein the thickness of the second insulation film is determined based on the thickness of the first insulation film.

12. A method of manufacturing a thin film transistor device according to claim 9, wherein the thickness of the second insulation film is determined based on the thickness of the first insulation film.

13. A method of manufacturing a thin film transistor device according to claim 10, wherein the thickness of the second

insulation film is determined based on the thickness of the first insulation film.

14. A thin film transistor device comprising:

a semiconductor layer having a predetermined configuration formed on a substrate;

a first insulation film formed on the semiconductor layer;

a gate electrode of a thin film transistor of a first conductivity type formed on the first insulation film;

source and drain regions and low density impurity regions formed by implanting an impurity of the first conductivity type in the semiconductor layer; and

a second insulation film having a predetermined thickness formed on the source and drain regions and the low density impurity regions.

15. A thin film transistor device comprising:

a semiconductor layer having a predetermined configuration formed on a substrate;

a first insulation film formed on the semiconductor layer;

a gate electrode of a thin film transistor of a first conductivity type formed on the first insulation film;

a gate insulation film formed on the semiconductor layer under the gate electrode and in the vicinity of the same;

a second insulation layer serving as a mask layer for implanting an impurity of the first conductivity type in the semiconductor layer;

source and drain regions formed by implanting an impurity

of the first conductivity type in the semiconductor layer using the gate electrode, the gate insulation film, and the second insulation film as masks; and

low density impurity regions formed in the vicinity of the gate electrode by implanting the impurity of the first conductivity type in the semiconductor layer under different conditions for impurity implantation using the gate electrode as a mask.

16. A thin film transistor device comprising:

a semiconductor layer having a predetermined configuration formed on a substrate;

a first insulation film formed on the semiconductor layer;

a gate electrode of a thin film transistor of a first conductivity type formed on the first insulation film;

low density impurity regions formed by implanting an impurity of the first conductivity type in the semiconductor layer;

a gate insulation film formed on the semiconductor layer under the gate electrode and in the vicinity of the same;

a second insulation film formed on the low density impurity regions as a mask layer for implanting the impurity of the first conductivity type in the semiconductor layer; and

source and drain regions formed by implanting the impurity of the first conductivity type in the semiconductor layer using the gate electrode, the gate insulation film, and the second insulation film as masks.



17. A thin film transistor device according to claim 14, further comprising a thin film transistor of a second conductivity type.

18. A thin film transistor device according to claim 14, comprising:

a third insulation film formed on the second insulation film;

contact holes formed by providing openings in each of the second and third insulation films on the source and drain regions; and

source and drain electrodes that are connected to the source and drain regions respectively through the contact holes.

19. A thin film transistor device according to claim 14, wherein the second insulation film has a thickness such that the degrees of reflection of the laser light at the low density impurity regions and the source and drain regions of the thin film transistor of the first conductivity type are substantially equal to each other.

20. A thin film transistor device according to claim 15, wherein the second insulation film has a thickness such that the degrees of reflection of the laser light at the low density impurity regions and the source and drain regions of the thin film transistor of the first conductivity type are substantially equal to each other.

21. A thin film transistor device according to claim 16, wherein the second insulation film has a thickness such that the degrees of reflection of the laser light at the low density impurity regions and the source and drain regions of the thin film transistor of the first conductivity type are substantially equal to each other.

22. A thin film transistor device according to claim 19, wherein the thickness of the second insulation film is determined based on the thickness of the first insulation film.

23. A thin film transistor device according to claim 20, wherein the thickness of the second insulation film is determined based on the thickness of the first insulation film.

24. A thin film transistor device according to claim 21, wherein the thickness of the second insulation film is determined based on the thickness of the first insulation film.

25. A thin film transistor substrate comprising the first thin film transistor devices connected to pixel electrodes arranged in the form of a matrix in a display area and second thin film transistor devices formed at a peripheral circuit outside the display area, the first and second transistor devices including a thin film transistor device according to claim 14.

26. A display apparatus comprising a substrate having a thin film transistor device to serve as a switching element,

wherein the substrate is a thin film transistor substrate according to claim 25.